

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-054085
 (43)Date of publication of application : 23.02.2001

(51)Int.Cl.
 H04N 7/14
 H04M 1/00
 H04M 1/60
 H04M 11/00
 H04N 5/57

(21)Application number : 11-228074

(71)Applicant : MATSUSHITA ELECTRIC IND CO LTD

(22)Date of filing : 12.08.1999

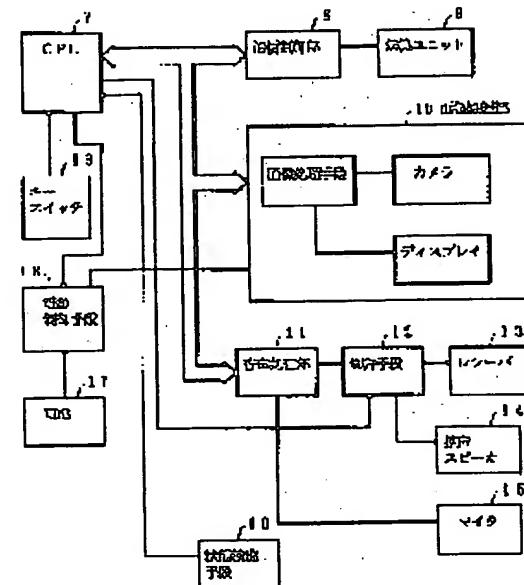
(72)Inventor : SUGITA MORIO

(54) PORTABLE TERMINAL DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To attain the automatic switching between a voice call mode and video telephone mode according to the using state showing only a voice call or the video telephone communication and with no conscious operation of an operator required.

SOLUTION: This portable terminal device includes an image processing part 10 which serves as a video telephone function, a receiver 13 which receives the calls with approach, a loudspeaker 14 which receives the calls, a switch means 12 which performs the switching between the receiver 13 and loudspeaker 14 and a state detection means 16 which detects a voice communication mode where the calling is carried out via the receiver 13 or a video telephone mode where the calling is carried out via a display. Thus, the automatic switching is performed to output the received voices via the receiver 13 when a voice call mode is detected by the means 16 and to output the received voices via the loudspeaker 14 when a video telephone mode is detected by the means 16.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

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CLAIMS

[Claim(s)]

[Claim 1] With the image-processing section as a TV phone function, and the receiver which outputs without expanding a receiver voice. The change means which changes the sound-reinforcement loudspeaker which expands and outputs a receiver voice, and said receiver or a sound-reinforcement loudspeaker. It has a condition detection means to detect whether it is voice talk mode or it is in TV phone mode. So that it outputs a receiver voice from a receiver when voice talk mode is detected by said condition detection means, and a receiver voice may be outputted from a sound-reinforcement loudspeaker, when TV phone mode is detected by said condition detection means. Personal digital assistant equipment characterized by changing talk mode automatically irrespective of the existence under call.

[Claim 2] It is personal digital assistant equipment according to claim 1 characterized by intercepting the current supply to said image-processing section with said power control means when said condition detection means detects that said personal digital assistant equipment was changed to voice talk mode including a power control means to control the current supply to said image-processing section.

[Claim 3] Said image-processing section is personal digital assistant equipment according to claim 1 or 2 characterized by having a means to extract the brightness information from a camera, and the brightness control means which controls the brightness of said display based on said extracted brightness information, and controlling the brightness of a display in said TV phone mode according to the brightness information from a camera while in use.

[Claim 4] Said image-processing section is personal digital assistant equipment according to claim 1 or 2 characterized by recognizing the magnitude of the brightness for photography with the video signal from said camera, and detecting whether said personal digital assistant equipment is voice talk mode or it is in TV phone mode with the magnitude of said brightness.

[Claim 5] Said condition detection means is personal digital assistant equipment according to claim 1 or 2 characterized by judging whether it is voice talk mode or it is in TV phone mode with the existence or extent of a touch including a touch sensor.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the personal digital assistant equipment with a TV phone function which can transmit and receive an image and voice simultaneously about personal digital assistant equipment.

[0002]

[Description of the Prior Art] When it is going to perform a TV phone, having personal digital assistant equipment which added the TV phone function in a hand, and looking at a partner's face conventionally anywhere, from the receiver which presses against the usual lug, with having outputted voice, distance is far and it cannot catch. Therefore, in the case of a TV phone, it is necessary to perform a loudspeaker telephone call using the loudspeaker for sound-reinforcement. Therefore, the switch or key carbon button for changing the call by the receiver of only the usual voice and the call by the loudspeaker telephone used at the time of a TV phone is prepared, and he was trying to use it in conventional personal digital assistant equipment, changing it by manual operation.

[0003]

[Problem(s) to be Solved by the Invention] However, according to factors, such as a situation of the surrounding noise, and the content of conversation, while using the above-mentioned conventional personal digital assistant equipment with a TV phone function, while talking over the telephone with the TV phone, what wants to change from the usual call to a TV phone may often occur in the case where he wants to change to the call only with the usual voice, and reverse. In that case, in having changed one by one manually, there was a problem that a change might be troublesome and the natural flow of conversation might be blocked.

[0004] moreover, when always left in TV phone mode (call by the sound-reinforcement loudspeaker of a TV phone), by voice talk mode, power was exhausted as personal digital assistant equipment which makes a cell actuation Hara, time amount which can be talked over the telephone was shortened, it may be unacquainted and there was a problem also during an activity, just because it was troublesome to have changed to voice talk mode (call by the audio receiver) one by one.

[0005] This invention offers the personal digital assistant equipment with a TV phone function which cuts down the power consumption of a cell and enables the call of long duration while the more natural user-friendliness of personal digital assistant equipment is obtained by changing TV phone mode and voice talk mode automatically if needed for an operator, without having been made in order to solve the above-mentioned conventional problem, and an operator operating it intentionally.

[0006]

[Means for Solving the Problem] The personal digital assistant equipment in this invention The image-processing section as a TV phone function, The receiver which outputs without expanding a receiver voice, and the sound-reinforcement loudspeaker which expands and outputs a receiver voice, [the change means which changes said receiver or a sound-reinforcement loudspeaker, and] [whether it is voice talk mode and] When it has a condition detection means to detect whether it is in TV phone mode and voice talk mode is detected by said condition detection means, a receiver voice is outputted from a receiver. When TV phone mode is detected by said condition detection means, it has the configuration of changing talk mode automatically, irrespective of the existence under call so that a receiver voice may be outputted from a sound-reinforcement loudspeaker. By this configuration, since an operator does not need to operate manually intentionally, it will be easy to use, and TV phone mode and voice talk mode can be changed automatically if needed for an operator.

[0007] The personal digital assistant equipment in this invention has the configuration of intercepting the current supply to said image-processing section with said power control means, when it is detected by said condition detection means including a power control means to control the current supply to said image-processing section that said personal digital assistant equipment was changed to voice talk mode. By this configuration, the power source of the image-processing section unnecessary at the time of voice talk mode can secure long duration of a call with the cell capacity which became power saving and was restricted since it was intercepted automatically.

[0008] It has the configuration that said image-processing section is equipped with a means to extract the brightness information from a camera, and the brightness control means which controls the brightness of said display based on said extracted brightness information, and the personal digital assistant equipment in this invention controls the brightness of a display in said TV phone mode according to the brightness information from a camera while in use. By this configuration, while the optimal screen is obtained by controlling the brightness of a display

automatically according to surrounding brightness by the brightness control means, the consumed electric current will also change according to surrounding brightness, and consumption of useless power can be prevented.

[0009] It has the configuration that said image-processing section recognizes the magnitude of the brightness for photography with the video signal from said camera, and the personal digital assistant equipment in this invention detects whether said personal digital assistant equipment is voice talk mode or it is in TV phone mode with the magnitude of said brightness. in order to judge talk mode according to the difference of the magnitude of the brightness for photography, without it is not influenced by surrounding brightness and uses a special sensor by this configuration — simplicity — talk mode is economically [automatically and] detectable.

[0010] The personal digital assistant equipment in this invention has the configuration that said condition detection means judges whether it is voice talk mode or it is in TV phone mode with the existence or extent of a touch including a touch sensor. Since a touch sensor will be pressed against a face by this configuration, if the suitable threshold is set up to the ratio of the area of a touch side, and the area of the skin which hits a touch side, CPU will recognize it and, as for the case of voice talk mode, can judge talk mode simply and automatically by it.

[0011]

[Embodiment of the Invention] Hereafter, the gestalt of 1 operation of this invention is explained to a detail based on drawing 1 thru/or drawing 5. First, with reference to drawing 1, the appearance configuration of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention is explained.

Drawing 1 is drawing showing the configuration of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention, and it is the side elevation which (A) removed the front view, and (B) removed the side attachment wall, and showed the interior. The personal digital assistant equipment shown in drawing 1 is constituted by the microphone 5 for inputting one's voice as the camera 1 for capturing the image sent to a communications partner, the display 3 for seeing the image sent from the communications partner, the receiver 2 for applying and asking the voice of a receiver to a lug, and the sound-reinforcement loudspeaker 6 for carrying out [voice / of a receiver] sound-reinforcement and hearing it, and the key switch carbon button 4 for operating personal digital assistant equipment.

[0012] When talking over the telephone, looking at the screen of a display 3 when operating the personal digital assistant equipment constituted as mentioned above, in order to detach and operate personal digital assistant equipment from a lug, it is necessary to output a partner's voice from the sound-reinforcement loudspeaker 6 with high sound volume. Since it is necessary to change personal digital assistant equipment to the receiver 2 with sound volume low when approaching and talking over the telephone to a lug on the other hand, a display 3 cannot be seen since a lug is approached in personal digital assistant equipment while using the receiver 2, and a camera 1 is also located in point-blank range to a face, a meaningful image cannot be photoed. Therefore, while talking over the telephone using a receiver 2, a function a camera 1 and display 3 grade image-related is not needed.

[0013] It is characterized by for the personal digital assistant equipment in the gestalt of operation of this invention detecting the busy condition, and changing between voice talk mode and TV phone modes automatically.

[0014] Next, with reference to drawing 2, the configuration of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention is explained. Drawing 2 is the block diagram showing the configuration of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention. CPU7 by which the personal digital assistant equipment shown in drawing 2 controls the whole personal digital assistant equipment. The communications control section 8 and the wireless unit 9 for personal digital assistant equipment to communicate by the electric wave, The image-processing section 10 which consists of an image-processing means, a camera, a display, etc. as a TV phone function, The speech processing section 11 for processing voice, and the change means 12 for changing an output for a receiver voice to a receiver 13 or the sound-reinforcement loudspeaker 14. It is constituted by the microphone 15 for inputting an operator's voice, the condition detection means 16 for a talk state to detect TV phone mode or voice talk mode, the cell 17 that is the power source of personal digital assistant equipment, and the power control means 18 for controlling ON/OFF of a power source.

[0015] Next, with reference to drawing 2, the automatic-switching approach of the talk mode (TV phone mode or voice talk mode) by actuation of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention is explained. If personal digital assistant equipment is made to approach a lug, it will detect that it is the call for which the busy condition of personal digital assistant equipment uses a receiver 13, and the condition detection means 16 will notify it to CPU7. Then, CPU7 is changed so that the change means 12 may be controlled and a receiver voice may be outputted from a receiver 13. Simultaneously, CPU7 controls the power control means 18, and intercepts the power source of the image-processing section 10. Moreover, if personal digital assistant equipment is conversely separated from a lug, the condition detection means 16 will detect that it is the call for which the busy condition of personal digital assistant equipment uses the sound-reinforcement loudspeaker 14, and will notify it to CPU7. Then, CPU7 is changed so that the change means 12 may be controlled and a receiver voice may be outputted from the sound-reinforcement loudspeaker 14. CPU7 controls the power control means 18 to it and coincidence, supplies the power source of the image-processing section 10 to them, and it is made to be possible [the image display of it] for them. It can control, as explained above, and ON/OFF of the change to a receiver 13 and the sound-reinforcement loudspeaker 14 and the power source of the image-processing section 10 can be performed automatically.

[0016] Next, with reference to drawing 3, the intensity control approach of a display is explained as actuation of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention. Drawing

3 is the block diagram showing the configuration of the brightness control means of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention. In drawing 3, the image-processing section 20 has the brightness control means 23 which controls the brightness of a display 22 to the interior or exterior, and the luminance signal for photography is extracted from the video signal outputted from the camera 21 in the image-processing section 20, the brightness control means 23 is controlled and it controls [it carries out regulating automatically of the brightness of a display 22 with the magnitude of the luminance signal, and] CPU7 to become the optimal brightness. Thus, while the optimal screen is obtained by controlling the brightness of a display 22 automatically by the brightness control means 23, the consumed electric current can also change according to surrounding brightness, and consumption of useless power can be prevented.

[0017] Next, with reference to drawing 4, the judgment and the automatic-switching approach of the talk mode of personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention are explained. Drawing 4 is the block diagram showing the judgment of the talk mode of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention, and the configuration of an automatic change means. First, in the image-processing section 20, a luminance signal is extracted from the video signal from a camera 21, and CPU7 judges talk mode of TV phone mode or voice talk mode from the information on a luminance signal. That is, in the case of the voice talk mode which used the receiver 13, since a camera will be in the condition of being pressed against a face, the magnitude of a luminance signal becomes extremely small and it will be clearly distinguished from the case in TV phone mode. If it puts in another way, detection of talk mode will become possible simply and certainly, without being influenced by surrounding brightness by setting up the threshold of CPU7 appropriately, in order for the result of having performed the difference of the magnitude of the brightness for photography or the similar operation to perform the judgment of talk mode.

[0018] Thus, if the talk state of personal digital assistant equipment is detected, CPU7 controls the change means 12 based on the judgment of talk mode, and if the brightness for photography is small, it will judge with voice talk mode and will change to a receiver 13 automatically, and if the brightness for photography is large, it will be judged to be TV phone mode, and it will change it to the sound-reinforcement loudspeaker 14 automatically. With it, as mentioned above, CPU7 can turn off the power source over the image-processing section 10, when using a receiver 13, when using the sound-reinforcement loudspeaker 14, it can control it to turn on the power source over the image-processing section 10, and it can prevent consumption of useless power.

[0019] Next, with reference to drawing 5, the detection approach of the talk state by the touch sensor of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention is explained. Drawing 5 is the block diagram showing the configuration containing the touch sensor of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention. In drawing 5, a touch sensor 24 and LCD25 constitute a LCD display with a touch sensor. If the touch sensor 24 of a LCD display is pressed against a face, the condition detection means 16 senses it, judges it to be the voice talk mode by the receiver 13, and when a touch sensor 24 is not pressed against a face, it will be judged to be the TV phone mode which uses the sound-reinforcement loudspeaker 14 with a suitable threshold.

[0020] For example, since a touch sensor 24 will be pressed against a face in the case of the voice talk mode using the receiver 13 as a suitable threshold, if the suitable threshold is set up to the ratio of the area of a touch side, and the area of the skin which hits a touch side, CPU7 can judge it and can recognize talk mode automatically. Moreover, by using the touch function by the touch sensor 24, various control is attained and user-friendly personal digital assistant equipment is obtained. In addition, although it explains above, as long as it can attain the object of others and this invention as a condition detection means 16, what kind of other means may be used.

[0021]

[Effect of the Invention] By being constituted as mentioned above and having changed the receiver voice to TV phone mode or voice talk mode automatically by change of a talk state especially, since an operator does not need to perform change actuation intentionally, it is easy to use this invention, and the call of it which does not bar the natural flow of conversation is attained.

[0022] This invention is constituted as mentioned above, and it becomes power saving by having intercepted the power source of the unnecessary image-processing section automatically especially at the time of voice talk mode, and it can secure long duration of a call with a limited cell capacity.

[0023] The consumed electric current will also change according to the brightness for photography, and this invention can prevent consumption of useless power, while the optimal screen is obtained by being constituted as mentioned above and controlling the brightness of a display automatically especially according to the brightness for photography by the brightness control means.

[0024] in order to constitute this invention as mentioned above and to judge talk mode according to the difference of the magnitude of the brightness for photography especially, without it is not influenced by surrounding brightness and uses a special sensor -- simplicity -- talk mode can be detected automatically and economically.

[0025] Since this invention will be constituted as mentioned above and a touch sensor will be pressed against a face especially in the case of voice talk mode If it can change certainly and the suitable threshold is set up to the ratio of the area of a touch side, and the area of the skin which hits a touch side with the touch sensor While CPU can judge it and can recognize talk mode certainly, various control is attained by the activity of a touch function, and user-friendly personal digital assistant equipment can be offered.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the side elevation which was drawing showing the configuration of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention, and (A) removed the front view, and (B) removed the side attachment wall, and showed the interior.

[Drawing 2] The block diagram showing the configuration of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention.

[Drawing 3] The block diagram showing the configuration of the brightness control means of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention.

[Drawing 4] The block diagram showing the judgment of the talk mode of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention, and the configuration of an automatic change means.

[Drawing 5] The block diagram showing the configuration containing the touch sensor of the personal digital assistant equipment with a TV phone function in the gestalt of 1 operation of this invention.

[Description of Notations]

- 1 Camera
- 2 Receiver
- 3 Display
- 4 Key Switch Carbon Button
- 5 Microphone
- 6 Sound-reinforcement Loudspeaker
- 7 CPU
- 8 Communications Control Section
- 9 Wireless Unit
- 10 Image-Processing Section
- 11 Speech Processing Section
- 12 Change Means
- 13 Receiver
- 14 Sound-reinforcement Loudspeaker
- 15 Microphone
- 16 Condition Detection Means
- 17 Cell
- 18 Power Control Means
- 19 Key Switch
- 20 Image-Processing Section
- 21 Camera
- 22 Display
- 23 Brightness Control Means
- 24 Touch Sensor
- 25 LCD
- 26 LCD Controller

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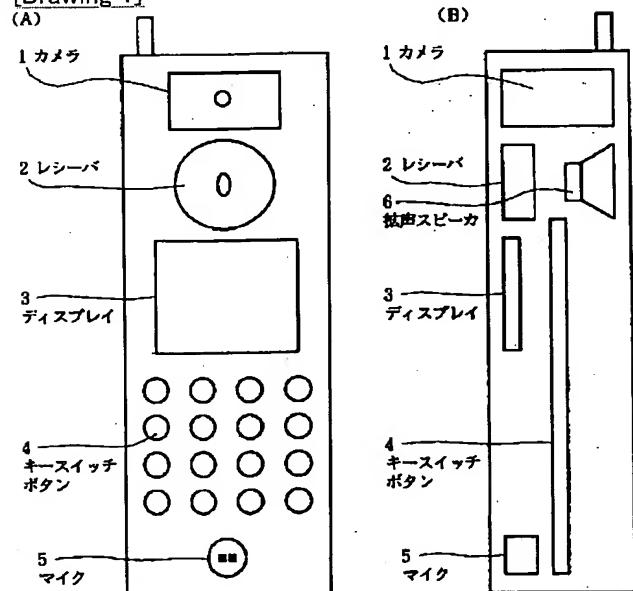
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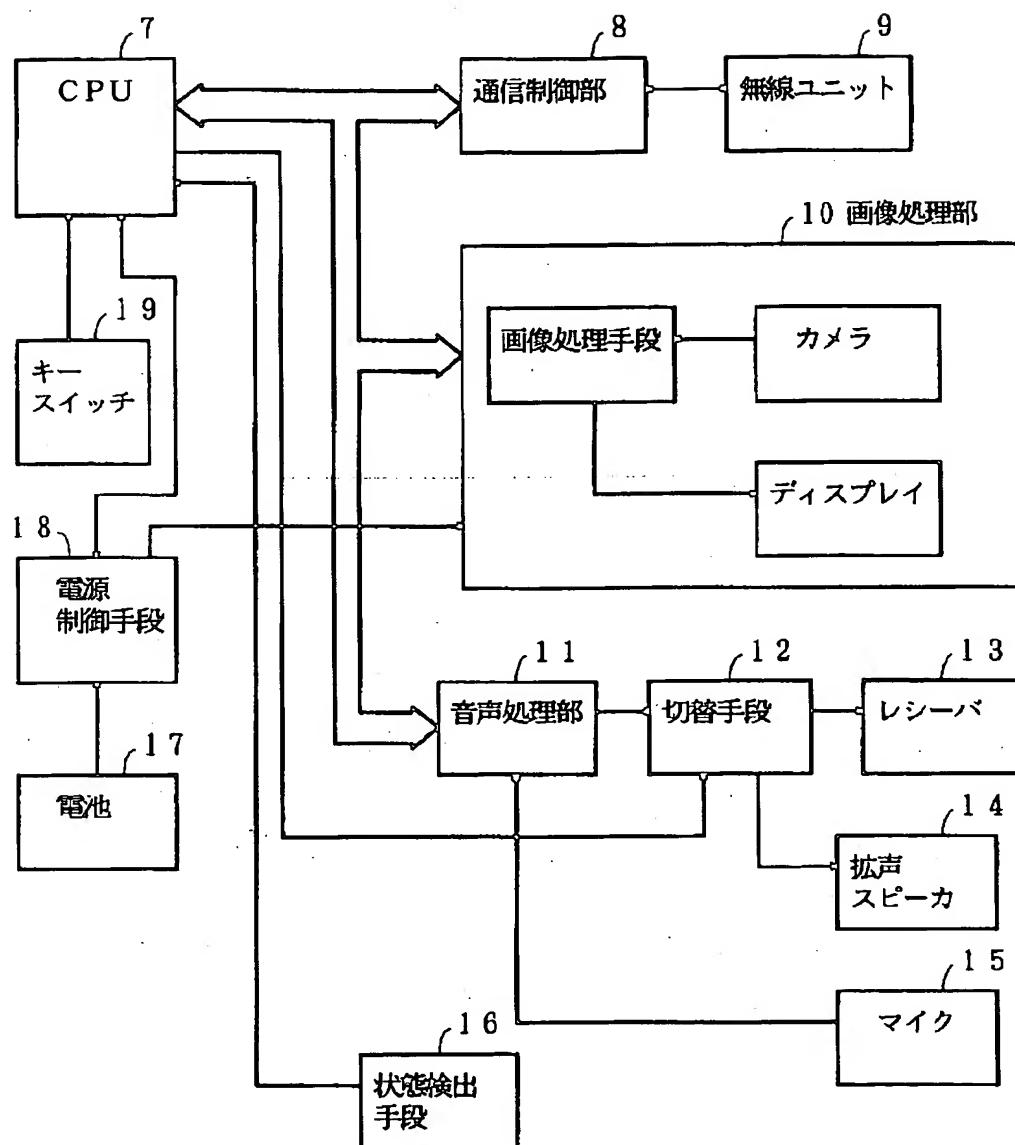
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DRAWINGS

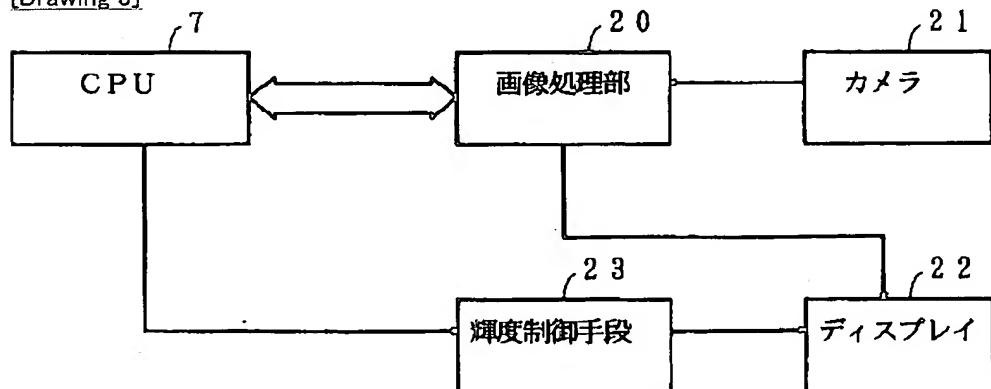
[Drawing 1]



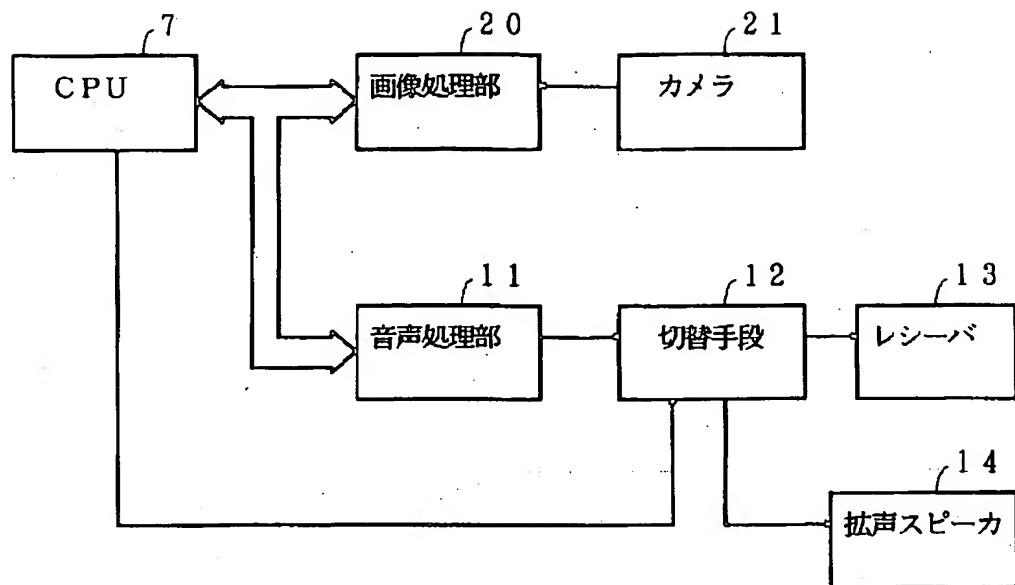
[Drawing 2]



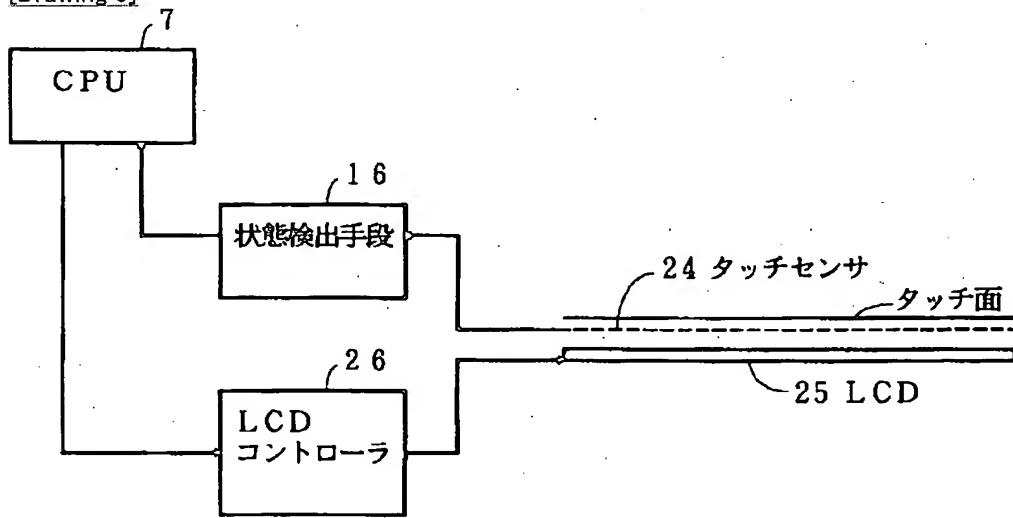
[Drawing 3]



[Drawing 4]



[Drawing 5]



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